

## ABSTRACT

In a waveguide element using a photonic crystal including a core formed of a photonic crystal having a refractive index periodicity in at least two directions perpendicular to a propagation direction of an electromagnetic wave and a cladding arranged in contact with the core in order to confine the electromagnetic wave in the core, an incident side phase modulation portion is provided for allowing an electromagnetic wave that is coupled to a band on or near a Brillouin zone boundary in a photonic band structure in the core and propagates in the core to enter the core.